Marked-up in red-ink copy of the amended claims marking the implementation of examiner's suggestions

Amendments to the CLAIMS:

Listing of CLAIMS:

Claims 1-18 (Previously Canceled)
Claims 19-27 (Cancelled)

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

28. (New): A method of forming/defining and solving a model of a power network to affect control of voltages and power flows in a power system, comprising the steps of:

obtaining on-line/simulated data of open/close status of switches and circuit breakers in a power network, and reading data of operating limits of components of a power network including PV-node, a generator-node where Real-Power-P and Voltage-Magnitude-V are given/assigned/specified/set, ~~generators~~ maximum and minimum reactive power generation capability limits of generators and transformers tap position limits,

obtaining on-line readings of given/assigned/specified/set real-power-P and reactive-power-Q at PQ-nodes, the nodes where Real-Power-P and Reactive-Power-Q are given/assigned/specified/set, real-power-P and voltage-magnitude-V at PV-nodes, voltage magnitude and angle at the reference/slack node, and transformer turns ratios, which are the controlled variables/parameters,

initiating loadflow computation with initial approximate/guess solution of the same voltage magnitude and angle as those of the reference/slack node for all the other nodes referred to as a slack-start,

performing loadflow computation to calculate complex voltages or their real and imaginary components or voltage magnitude corrections and voltage angle corrections at nodes of a power network providing for calculation of power flow through different components of a power network, and reactive power generation and transformer tap-position indications,

decomposing a network for performing loadflow computation in parallel by a method referred to as Suresh's diakoptics that involves determining a sub-network for each node involving directly connected nodes referred to as level-1 nodes and

directly connected nodes to level-1 nodes referred to as level-2 nodes, and a level of outward connectivity for local solution of a sub-power-network around a given node is determined experimentally,

initializing, at the beginning of each new iteration, a vector of dimension equal to the number of nodes in a network with each element value zero, solving all sub-networks in parallel using available solution estimate at the start of the iteration, adding newly calculated solution estimates for a node resulting from different sub-networks, 'q' number of sub-networks, in which a node is contained, in a corresponding vector element that gets initialized zero at the beginning of each new iteration, counting the number of additions and calculating new solution estimate or corrections to the available solution estimate by taking the average or root mean square value using any relevant relations in the following depending on the loadflow computation method used, and storing the new solution estimate at the end of the current iteration as initial available estimate for the next iteration,

words "say" removed from here

$$V_p^{(r+1)} = (V_{p1}^{(r+1)} + V_{p2}^{(r+1)} + V_{p3}^{(r+1)} + \ldots + V_{pq}^{(r+1)})/q \quad (30)$$

$$\Delta\theta_p^{(r+1)} = (\Delta\theta_{p1}^{(r+1)} + \Delta\theta_{p2}^{(r+1)} + \Delta\theta_{p3}^{(r+1)} + \ldots + \Delta\theta_{pq}^{(r+1)})/q \quad (31)$$

$$\Delta V_p^{(r+1)} = (\Delta V_{p1}^{(r+1)} + \Delta V_{p2}^{(r+1)} + \Delta V_{p3}^{(r+1)} + \ldots + \Delta V_{pq}^{(r+1)})/q \quad (32)$$

$$e_p^{(r+1)} = (e_{p1}^{(r+1)} + e_{p2}^{(r+1)} + e_{p3}^{(r+1)} + \ldots + e_{pq}^{(r+1)})/q \quad (33)$$

$$f_p^{(r+1)} = (f_{p1}^{(r+1)} + f_{p2}^{(r+1)} + f_{p3}^{(r+1)} + \ldots + f_{pq}^{(r+1)})/q \quad (34)$$

relations (30) to (34), can also alternatively be written as relations (35) to (39) as below,

yes, equations (35) to (39) require square-roots.

$$V_p^{(r+1)} = \sqrt{\mathbf{Re}\left((V_{p1}^{(r+1)})^2\right) + \mathbf{Re}\left((V_{p2}^{(r+1)})^2\right) + \ldots + \mathbf{Re}\left((V_{pq}^{(r+1)})^2\right)/q}$$

$$+\, \mathbf{j} \sqrt{(\mathbf{Im}((V_{p1}^{(r+1)})^2) + \mathbf{Im}((V_{p2}^{(r+1)})^2) + \ldots + \mathbf{Im}((V_{pq}^{(r+1)})^2))/q} \quad (35)$$

$$\Delta\theta_p^{(r+1)} = \sqrt{(\Delta\theta_{p1}^{(r+1)})^2 + (\Delta\theta_{p2}^{(r+1)})^2 + \ldots + (\Delta\theta_{pq}^{(r+1)})^2)/q} \quad (36)$$

$$\Delta V_p^{(r+1)} = \sqrt{(\Delta V_{p1}^{(r+1)})^2 + (\Delta V_{p2}^{(r+1)})^2 + \ldots + (\Delta V_{pq}^{(r+1)})^2)/q} \tag{37}$$

$$e_p^{(r+1)} = \sqrt{((e_{p1}^{(r+1)})^2 + (e_{p2}^{(r+1)})^2 + \ldots + (e_{pq}^{(r+1)})^2)/q} \tag{38}$$

$$f_p^{(r+1)} = \sqrt{((f_{p1}^{(r+1)})^2 + (f_{p2}^{(r+1)})^2 + \ldots + (f_{pq}^{(r+1)})^2)/q} \tag{39}$$

wherein, square of any positive or negative number being positive, if the original not-squared value of any number is negative, the same algebraic sign is attached after squaring that number, and if the mean of squared values turns out to be a negative number, negative sign is attached after taking the square root of the unsigned number, V_p, θ_p voltage magnitude and voltage angle at node-p, e_p and f_p are the real and imaginary parts of the complex voltage $\mathbf{V}_p$ of node-p, symbol Δ before any of defined electrical quantities defines the change in the value of electrical quantity, and superscript 'r' indicates the iteration count,

evaluating loadflow computation for any of the over loaded components of a power network and for under/over voltage at any of the nodes of a power network,

correcting one or more controlled parameters and repeating the performing loadflow computation by decomposing, initializing, and evaluating, and correcting steps until evaluating step finds no over loaded components and no under/over voltages in a power network, and

affecting a change in power flow through components a power network and voltage magnitudes and angles at the nodes of a power network by actually implementing the finally obtained values of controlled variables/parameters after evaluating step finds a good power system or alternatively a power network without any overloaded components and under/over voltages, which finally obtained controlled variables/parameters however are stored in case of simulation for acting upon fast in case the simulated event actually occurs.

29. (New): A method as defined in claim-28 wherein the loadflow computation method referred to as Gauss-Seidel-Patel Loadflow (GSPL) computation method is characterized in using self-iteration denoted by 'sr' within a network-wide/sub-

Yes, equation (27) is part of claim-29. It is rearranged in the claim to remove any ambiguity

network-wide global iteration depicted by 'r' in the GSPL model defined by equation (27) given in the following,

$$(V_p^{(sr+1)})^{(r+1)} = [\{(PSH_p - jQSH_p)/((V_p^*)^{sr})^r\} - \sum_{q=1}^{p-1} Y_{pq}V_q^{(r+1)} - \sum_{q=p+1}^{n} Y_{pq}V_q^r] / Y_{pp} \qquad (27)$$

wherein, PSH_p and QSH_p are scheduled/specified/known/set real and reactive power, $\mathbf{V_p}$ is the complex node-p voltage, and $\mathbf{Y_{pq}}$ and $\mathbf{Y_{pp}}$ are off-diagonal and diagonal complex elements of the network admittance matrix.

30. (New): A method as defined in claim-28 wherein a parallel loadflow computation is performed using a parallel computer: a server processor-array processors architecture, wherein each of the array processors send communication to and receive communication from only the server processor, commonly shared memory locations, and each processor's private memory locations, but not among themselves.

31. (New): A system for performing a method as defined in claim-28, for controlling generator and transformer voltages in an electrical power utility containing plurality of electromechanical rotating machines, transformers and electrical loads connected in a network, each rotating machine having a reactive power characteristic and an excitation element which is controllable for adjusting the reactive power generated or absorbed by the machine, and some of the transformers each having a tap changing element which is controllable for adjusting turns ratio or alternatively terminal voltage of the transformer, said system comprising:

means for defining and solving the Parallel Loadflow computation model of a power network as defined in claim-28 for providing an indication of the quantity of reactive power to be supplied by each generator including the reference/slack node generator, and for providing an indication of turns ratio of each tap-changing transformer in dependence on the set of obtained-online readings or given/specified/set controlled network variables/parameters, and physical limits of operation of the network components, words removed

means for machine control connected to ~~the~~ said means for defining and solving the

parallel loadflow computation model of a power network and to an excitation element of each rotating machine for controlling the operation of the an excitation element of each rotating machine to produce or absorb the amount of reactive power indicated by the said means for defining and solving the parallel loadflow computation model of a power network in dependence on the set of obtained-online readings or given/specified/set controlled network variables/parameters, and physical limits of excitation elements,

words removed

means for transformer tap position control connected to ~~the~~ said means for defining and solving the parallel loadflow computation model of a power network and to the tap changing elements of the controllable transformers for controlling the operation of the tap changing elements to adjust the turns ratios of transformers indicated by ~~the~~ said means for defining and solving the parallel loadflow computation model of a power network in dependence on the set of obtained-online readings or given/specified/set controlled network variables/parameters, and operating limits of the tap-changing elements.

words removed

32. (New): A system as defined in claim-31 wherein a power network includes a plurality of nodes each connected to at least one of: a reference/slack generator; a rotating machine; and an electrical load, and the said means for defining and solving the parallel loadflow computation model of a power network receives representations of selected values of the real and reactive power flow from each machine and to each load, and the model is operative for producing calculated values for the reactive power quantity to be produced or absorbed by each machine.

33. (New): A system as defined in claim-32 wherein a power network further has at least one transformer having an adjustable transformer turns ratio, and the said means for defining and solving the parallel loadflow computation model of a power network is further operative for producing a calculated value of the transformer transformation/turns ratio.

34. (New): A system as defined in claim-31 wherein said means for rotating machine control are connected to said excitation element of each machine for controlling the operation of said excitation element of each rotating machine, and wherein said means for transformer tap position control are connected to said each

transformer having a tap changing element for controlling the operation of a tap changing element of each transformer.

35. (New): A method using a method as defined in claim-28, for controlling generator and transformer voltages in an electrical power utility containing plurality of electromechanical rotating machines, transformers and electrical loads connected in a network, each rotating machine having a reactive power characteristic and words added an excitation element ~~which is~~ controllable for adjusting the reactive power generated or absorbed by ~~the~~ a rotating machine, and some of the transformers each having words added word added a tap changing element which is controllable for adjusting turns ratio or alternatively terminal voltage of the transformer, said method comprising:

creating and solving the Parallel Loadflow computation model of a power network as defined in claim-28 for providing an indication of turns ratio of each of the tap-changing transformers and the quantity of reactive power to be supplied by each generator in dependence on the set of obtained-online readings or given/specified/set controlled network variables/parameters, and physical limits of operation of the network components,

controlling the operation of an excitation element of each rotating machine to produce or absorb the amount of reactive power, and controlling a tap changing element of transformer to adjust transformer turns ratio indicated by means for creating/forming/defining and solving the said Parallel Loadflow computation model in dependence on the set of obtained-online readings or given/specified/set controlled network variables/parameters, and physical limits of operation of ~~the network~~ components of a power network words added and rearranged

36. (New): A method as defined in claim-35 wherein said step of controlling is carried out to control the excitation element of each machine and a said step of controlling is carried out to control the tap-changing element of each controllable transformer.